

We claim:

1. A thermoplastic film comprising:
  - a. a core layer comprising about 60 wt% to about 95 wt% of a polylactic acid having a D-lactic acid level from about 1 mol% to about 8 mol%, and about 5 wt% to about 40 wt% of a toughening additive, wherein the core layer comprises the interior of the film.
2. The thermoplastic film of claim 1 further comprising:
  - b. a first skin layer comprising a polylactic acid having a D-lactic acid level of at least about 8 mol%, wherein the first skin layer is exterior to the core layer.
3. The thermoplastic film of claim 2 further comprising:
  - c. a second skin layer comprising a polylactic acid having a D-lactic acid level of at least about 8 mol%, wherein the second skin layer is exterior to the core layer, and on a side of the core layer opposite the first skin layer.
4. The thermoplastic film of claim 2 wherein the first skin layer further comprises a slip additive.
5. The thermoplastic film of claim 2 wherein the first skin layer from about 1 wt% to about 10 wt% of a poly(epsilon-caprolactone).
6. The thermoplastic film of claim 1 wherein the toughening additive is selected from the group consisting of poly(epsilon-caprolactone), metallocene plastomers, styrene-ethylene-butene-styrene (SEBS) block copolymers, polyethylene succinate, polybutylene succinate/adipate, polybutylene succinate/carbonate, polyethylene, polyurethane, and mixtures thereof.
7. The thermoplastic film of claim 1 wherein the core layer is cavitated.
8. The thermoplastic film of claim 7 further comprising an inorganic cavitating agent selected from the group consisting of solid glass spheres, hollow glass spheres, metal beads, metal spheres, ceramic spheres, calcium carbonate, and mixtures thereof.
9. The thermoplastic film of claim 7 wherein the cavitating agent comprises calcium carbonate, and wherein the core layer further comprises high density polyethylene.

10. The thermoplastic film of claim 1 wherein the film has a thickness from about 1 mil to about 5 mils.
11. The thermoplastic film of claim 1 wherein the film has a thickness from about 1 mil to about 10 mils.
- 5 12. The thermoplastic film of claim 1 wherein the film is biaxially oriented.
13. A thermoplastic sleeve label adapted to be applied to a container comprising:
  - a. a core layer comprising about 60 wt% to about 95 wt% of a polylactic acid having a D-lactic acid level from about 1 mol% to about 8 mol%, and about 5 wt% to about 40 wt% of a toughening additive, wherein the core layer
  - 10 comprises the interior of the label; and
  - b. a first skin layer comprising a polylactic acid having a D-lactic acid level of at least about 8 mol%, wherein the first skin layer is exterior to the core layer.
14. A container having a thermoplastic sleeve label comprising:
  - 15 a. a surface of the container;
  - b. an adhesive adjacent to the surface;
  - c. a label comprising a core layer comprising about 60 wt% to about 95 wt% of a polylactic acid having a D-lactic acid level from about 1 mol% to about 8 mol%, and about 5 wt% to about 40 wt% of a toughening additive,
  - 20 wherein the core layer comprises the interior of the label; and a first skin layer comprising a polylactic acid having a D-lactic acid level of at least about 8 mol%, wherein the first skin layer is exterior to the core layer.
15. The container of claim 14 wherein the label further comprises a second skin layer comprising a polylactic acid having a D-lactic acid level of at least about
- 25 8 mol%, wherein the second skin layer is exterior to the core layer, and on a side of the core layer opposite the first skin layer.
16. A process for producing a thermoplastic sleeve label comprising the steps of:
  - a. coextruding a core layer comprising about 60 wt% to about 95 wt% of a polylactic acid having a D-lactic acid level from about 1 mol% to about 8
  - 30 mol%, and about 5 wt% to about 40 wt% of a toughening additive, wherein the core layer comprises an interior of the film; and a first skin layer

comprising a polylactic acid having a D-lactic acid level of at least about 8 mol%, wherein the first skin layer is exterior to the core layer;

- b. orienting said label in the machine direction;
  - c. heat annealing said label; and
  - 5 d. treating said label with at least one of plasma, corona, and flame treatment.
17. The process of claim 16, further comprising coextruding the core layer, wherein the core layer further comprises a second skin layer comprising a polyactic acid having a D-lactic acid level of at least about 8 mol%, wherein the second skin layer is exterior to the core layer, and on a side of the core
- 10 layer opposite the first skin layer.
18. The process of claim 17, further comprising the step of printing said label on at least one of the first skin layer and the second skin layer.
19. The process of claim 16, further comprising the step of printing said label on the first skin layer.
- 15 20. The process of claim 16, further comprising the step of forming said label into a tube and sealing said label with a seal selected from the group consisting of solvent seal, heat seal, ultrasonic seal, and adhesive seal.
21. The process of claim 16 further comprising the step of orienting said label in the transverse direction.
- 20 22. The process of claim 16 further comprising the steps of:
- a. placing said tube onto a container; and
  - b. shrinking said tube with the application of at least one of heat and UV light.